the neighbourhood (e.g. Hopper and Burbidge, 1978). If such preferential behaviour was operative among the New Holland Honeyeaters at Qualup, they would clearly constitute a powerful selective force on the phenology, floral morphology and nectar secretion of plant species competing for pollinator service.

While the present study has established that New Holland Honeyeaters do transport pollen of and probably pollinate several plant species at Qualup, further research is needed to provide a satisfactory understanding of the ecological interactions and evolutionary responses of participants in this pollination system.

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OBSERVATIONS ON WIND-BLOWN SUPERPHOSPHATE IN NATIVE VEGETATION

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INTRODUCTION

Vegetation on wheatbelt reserves is often seen to be taller and denser adjacent to paddocks than is observed deeper into the reserve. On occasions this can be attributed to increased drainage from the adjacent farmland but is also observed uphill from some paddocks. Muir (1977) records an instance of increased foliage density, increased number of fruit, and changes in floristics when fertilisers affect roadside vegetation. Stimulation of growth rates after contact with fertiliser are also documented (Bradshaw *et al.*, 1964; Driessche and Warcing, 1966). An uncertainty in many observations is whether the phosphate enters the reserve or road verge as windblown material or as a subsurface solution. The former was suspected because phosphate movement in soil is very limited, particularly in light sandy soil (Russell, 1961). Additionally, in many wheatbelt areas there are strong north-westerly winds during the periods of ploughing and fertiliser application, and at which times dust is likely to enter bushland. Particles of fertiliser may be transported considerable distances at this time. Observations of superphosphate particles undergoing saltational wind transportation along a firebreak 1 km into a reserve from the nearest cleared land have been made at Bendering Reserve (Muir, 1977).

This paper presents the results of two observations made on phosphate levels in light sandy soils in the Wongan Hills area.

METHODS

Soil samples at site 1 were taken at 0-10 em and 50-60 em below the litter layer: and 20, 10 and 5 m into the paddoek from the edge of the reserve, at the reserve edge and 2, 4, 7 and 10 m into the reserve (see diagram 1 below).

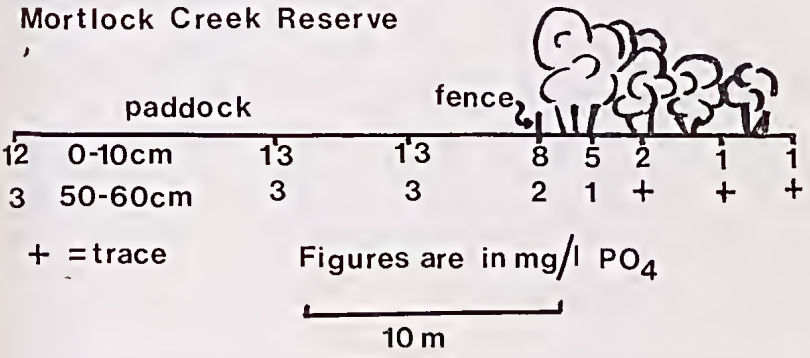

Diagram 1.

At site 2 samples were at the same depths as site 1 but were taken at the feneeline of the paddoek, in the area of deepest windblown debris (about 5 m into the reserve), and 25 m and 50 m into the reserve (see diagram 2 below).

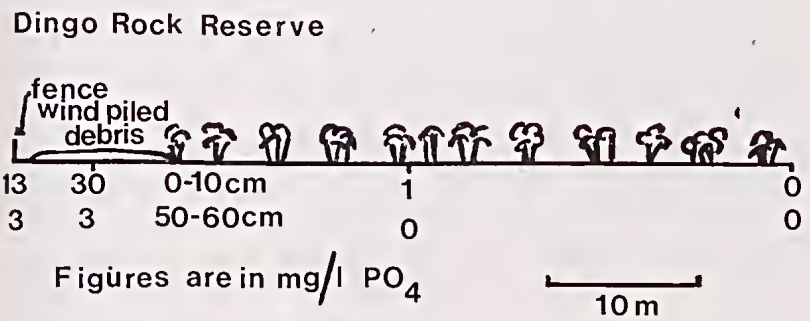

Diagram 2.

Soil samples were homogenised, sieved to remove particles larger than 2 mm and digested for 24 hours in 0.5 M sodium bicarbonate solution adjusted to pH 8.5, at a rate of 1 gram of soil to 100 mls of solution. Samples were then filtered and divided into two aliquots. Phosphate determinations were made on one aliquot using the ammonium molybdate/ascorbic aeid technique and the other, untreated aliquot as a blank. Levels of phosphate were determined eolorimetrieally using a Bauseh and Lomb Mini-spee 20 speetrophotometer set at a wavelength of 700 nm.

OBSERVATIONS

Site 1. Sample area on the western boundary of Mortlock Creek Flora Reserve (23313), *ca* 15 km NW of Wongan Hills townsite and shown on Lands Department lithograph 57/80, C-D/2. The vegetation of the reserve has been briefly described by Kenneally (1977) and by Muir (1978). The portion studied was dominated mostly by *Banksia prionotes* trees 5 m tall and 70-100% eanopy eover whereas the same assemblage deeper into the Reserve is shorter (3 m) and less dense (30-70% eover). The shrubby understory is similarly affected. Soil in both areas is yellow (Munsell (1954)

code 10YR7/8), clayey sand. There is no horizon development and the soil is well drained. The belt of vegetation affected is uphill and to the east of cleared farmland and the denser marginal belt 5 m broad at the point of examination.

Site 2. Sample area on the northern boundary of Dingo Rock Reserve (13494), *ca* 21 km E of Wongan Hills townsite and shown on Lands Department lithograph 56/80, A/3. The vegetation of the reserve has been briefly described by Muir (1978). At this site the vegetation was *Casuarina campestris* shrubland 3 m tall, 10-30% canopy cover with an understory of sedges and shrubs. The vegetation shows only slightly enhanced growth on the boundary adjacent to the paddock but this may be because of the distance from the paddock. Topography and position suggest superphosphate would only be blown into the reserve on rare occasions. Such an occasion occurred following Cyclone Alby (April 4, 1978) when large amounts of topsoil and wheat stalks were blown into the Reserve and piled to 30 cm deep against the vegetation. Soil at this site was brownish yellow (10YR6/8), sandy clay loam with no horizon development, and well drained. Soil samples were taken 95 days after the cyclone. In the intervening period 79 mm of rain fell in the area.

DISCUSSION

Superphosphate particles have been observed undergoing saltation movement up to 1 km into a reserve from the nearest source (Muir, 1977) and this data suggests that it is commonly wind-blown into reserves for at least several metres. The phosphate levels in the soil may be raised by up to 8 times their normal value (normal assumed to be < 1 mg/1 as determined by this method). Changes in morphology, flowering, fruit production and floristics have been observed as a result. Long term changes in the vegetation as a result of this are inevitable, particularly on long, narrow reserves with their long axis orientation approximately north-south, thus increasing the target area for superphosphate particles carried on north-westerly winds.

There is very little vertical or subsurface lateral movement of dissolved phosphate even when source paddocks received fertiliser for some years. The effect of subsurface leaching into the reserves is thus likely to be minimal in light soils similar to these. However, it must be noted that Russell (1961) indicates subsurface movement in waterlogged soils e.g. on drainage lines in heavy soil country, may be considerable. He suggests this may be due to ferrous ions acting as transporting agents. Such transportation may explain dense shrubby growth observed on some drainage lines leading into reserves from adjacent farmland.

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